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Japanese Published Unexamined (Kokai) Patent Publication No. S58-145435; Publication Date: August 30, 1983; Application No. S57-29358; Application Date: February 23, 1982; Int. Cl.³: B29J 1/02; Inventor: Takashi Miura; Applicant: National House Industry Co., Ltd.; Japanese Title: Dannetsushiito no Seizouhouhou (Method for Production of Heat-Insulating Sheet)

Specification

1. Title of Invention

Method for Production of Heat-Insulating Sheet

2. Claim

A method for production of a heat-insulating sheet, characterized by providing the following steps in the production process: a step of supplying a plurality of heat-insulating material pieces onto a conveyor; a step of obtaining cut pieces of the heat-insulating material pieces transported on the conveyor by cutting them vertically and horizontally; a step of forming a heat-insulating sheet by closely arranging and adhering a plurality of the cut pieces on a sheet substrate.

3. Detailed Description of the Invention

This invention pertains to a producing method for a heat-insulating sheet.

A recycle of tips generated when a glass wool product of a residential heat-insulating material is produced and wastes generated when the heat-insulating material is cut has been demanded. A method is proposed as a recycling, such that tips and wastes are filled into the back of a residential ceiling or a hollow panel using a pulverization blowing

technique. Nevertheless, the size of the equipment for pulverizing the tips and wastes increases to increase the cost for the equipment. A pulverization precision is also required. Furthermore, even though the filling of the tips and wastes in a flat panel or the back of the ceiling is easily performed, vertically used panels with intermediate bridges such as an outer wall panel, a partitioning panel and the like require filling holes to be provided in locations. A repair after the completion of the filling is not easily made. Thereby, it is almost not possible for the tips and wastes to be put to the practical use. Furthermore, tips and wastes of the heat-insulating material cannot be burned or decomposed. The difficulty in the discard of the tips and wastes causes pollution.

Accordingly, the purpose of the invention is to offer a producing method for a highly usable heat-insulating sheet that is capable of recycling the tips and wastes of heat-insulating materials using simple equipment.

A working example of the invention is described in Fig.1 to Fig.4. First, a producing apparatus is described. In the drawings, reference number 1 refers to a cutting conveyor that consists of a belt conveyor. A vibration hopper 3 that accommodates heat-insulating material pieces 2 (Fig.3) that contain tips and wastes is attached onto the top of the starting end of the cutting conveyor 1. A vertical cutting blade 4 and a horizontal cutting blade 5 are provided around the starting end of the cutting conveyor 1 whereas a guide plate 6 on both sides of the upper surface of the cutting conveyor 1 through the starting end to the terminal end. The vertical cutting blade 4 consists of a plurality of circular rotation blades attached to a single rotating shaft. The horizontal cutting blade 5 consists of a single blade and is driven by an ascending and descending means. The guide plate 6 is formed so that the gap becomes gradually smaller from the starting end of the

cutting conveyor 1 to the vicinity of the horizontal cutting blade 5. The terminal end from the horizontal cutting blade 5 of the guide plate 6 is formed so as to become gradually smaller at a slight angle or be parallel. An adhering conveyor 7 is connected to the terminal end of the cutting conveyor 1. Sheet feeders 9 for feeding two upper and lower strip sheet substrates 8 are provided above and below the starting end of the adhering conveyor 7.

A producing method by using the device is described next. First, the heat-insulating material pieces 2 are supplied into the vibration hopper 3, which are tips or wastes of a glass wool or rock wool product. The supplied heat-insulating material pieces are successively supplied from the vibration hopper 3 to the cutting conveyor 1 and then successively vertically and horizontally cut into almost square cut pieces 2' (Fig.4) of a predetermined or smaller size using the vertical cutting blade 4 and the horizontal cutting blade 5 during a transfer. The rectangular cut pieces 2' are arranged so as to closely contact with each other for the guide plate 6 while they are transferred with the cutting conveyor 1. The rectangular cut pieces 2' are then fed on the lower sheet substrate 8 of the adhering conveyor 7 while they are tightly arranged. At the same time, the sheet substrate 8 is fed above the rectangular cut pieces 2' so that the cut pieces 2' are adhered on the sheet substrate 8 in a sandwiching means. The sheet substrates 8 consists of resin sheets made of paper, an aluminum foil or polyethylene and contains an adhesive adhered in advance. By these means, a strip heat-insulating sheet wherein the rectangular cut pieces 2' are tightly arranged on the sheet substrates 8 is formed.

As described above, as the heat-insulating sheet wherein the rectangular cut pieces 2' are tightly arranged on the sheet substrates 8 is obtained, it can be used as an inner

heat-insulating material for an outer wall or a vertical panel including a partitioning wall panel as similarly to as in prior art heat-insulating material product, thereby achieving a usable value that does not differ from a new product even though the heat-insulating sheet is a recycled material.

Moreover, since heat-insulating material pieces that were previously discarded are used, the material cost is zero, and the cost required for the discarding is also reduced. The producing apparatus is also simple as the vertical and horizontal cutting blades 4 and 5 and the sheet feeder 9 alone are provided on the conveyors 1 and 7, thereby achieving a simple structure.

At the working example, the rectangular cut pieces 2' are gripped with the two sheet substrates 8 by a sandwiching means and can also be adhered on a single strip sheet.

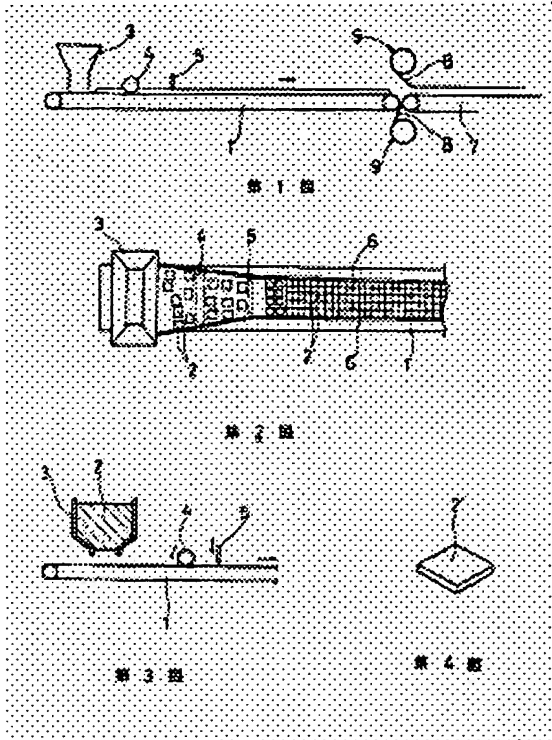
As described above, according to the producing method for the heat-insulating sheet of the invention, the heat-insulating material pieces made from tips and wastes are vertically and horizontally cut into fine cut pieces. These cut pieces are arranged tightly and adhered on the sheet substrate. Because of that, the produced heat-insulating sheet can be utilized for a variety of panels as totally similarly to as in a new heat-insulating material product, thereby improving the usable value, effectively carrying out a recycling process, and simplifying the producing apparatus.

4. Brief Description of the Drawings

Fig.1 is a side view illustrating a producing apparatus used for a working example of the invention. Fig.2 is a top view illustrating a part of the producing apparatus. Fig.3 is

a cross-sectional view illustrating an enlarged part of Fig.1. Fig.4 is a perspective view illustrating a rectangular cut piece.

- 1...Cutting conveyor
- 2...Heat-insulating material pieces
- 2'...Rectangular cut pieces
- 3...Vibration hopper
- 4... Vertical cutting blade
- 5...Horizontal cutting blade
- 6...Guide plate
- 7...Adhering conveyor
- 8...Sheet substrates
- 9...Sheet feeder



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